

## TRANSLATION of related part of Form PCT/ISA/237

## PATENT COOPERATION TREATY

From Japanese Patent Office

(INTERNATIONAL SEARCH AUTHORITY)

To: HAYASE, Kenichi  HAYASE & CO. 13F, NISSAY SHIN-OSAKA Bldg., 3-4-30, Miyahara, Yodogawa-ku, Osaka-shi, Osaka 532-0003 JAPAN	<b>PCT</b>  WRITTEN OPINION OF THE ISA (PCT Rule 43bis)
	Date of Mailing 19 April 2005

Applicant's or agent's file reference P36046-P0		See item 2 below for the subsequent procedure	
International application No. PCT/JP2004/019123	International filing date 21 December 2004	Priority date 22 December 2003	
International Patent Classification (IPC) or national classification and IPC Int. Cl. <sup>7</sup> H01S5/062			
Applicant Matsushita Electric Industrial Co., Ltd.			

## 1. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 43.2.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

OMISSION(2 and 3)

Date of completion of this opinion 29 March 2005
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Name and mailing address of the ISA/JP Japanese Patent Office	Authorized officer  Telephone No.
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ATTACHMENT E

TRANSLATION of related part of Form PCT/ISA/237

10/584091  
AP3 Rec'd PCT/PTO 22 JUN 2006

## WRITTEN OPINION OF THE ISA

International application No.  
PCT/JP2004/019123

## I. Basis of the opinion

1. This opinion has been drawn on the basis of the language of international application, unless otherwise indicated below.

OMISSION(2, 3, and 4)

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V Reasoned statement under Rule 43.2.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. STATEMENT

Novelty (N)	Claims 1-22	YES
	Claims NONE	NO
Inventive Step(IS)	Claims 9-10, 13-14	YES
	Claims 1-8, 11-12, 15-22	NO
Industrial Applicability (IA)	Claims 1-22	YES
	Claims NONE	NO

## 2. CITATIONS AND EXPLANATIONS

Document 1: JP 03-174791 A (Fujitsu Limited) 1991.07.29, Page 5, lower-right column ~ Page 6, upper-right column, and Fig.23 & US 5358898 A, Column 4, Lines 12-58, Fig.3 & JP 2966485 B & US 5170402 A & EP 409487 A3 & DE 69033405 D & DE 69033405 T & CA 2021140 A & CA 2131362 A & KR 9407603 B

The invention relating to Claim 1 has no inventive step over the document 1 that is cited in the International Search Report. The document 1 describes that, in a multi-electrode DFB laser, two divided electrodes are formed on a p type cladding layer, a reflection preventing film is disposed on the surface of one end of a cavity, the ratio of currents injected into the two electrodes is varied, and the current injected into the electrode on the side where the reflection preventing film is disposed is increased (refer to Page 5, lower-right column ~ Page 6, upper-right column, and Fig.23 etc.). Although the document 1 does not disclose that a semiconductor laser has a ridge type cladding layer, a semiconductor laser having a ridge type cladding layer is merely a well-known technique in this technical field, and therefore, those skilled in the art can easily adopt this technique in the invention described in the document.

Document 2: WELCH D.F., et al, "1.1 W CW, Diffraction-limited operation of a monolithically integrated flared-amplifier master oscillator power amplifier" In: ELECTRONICS LETTERS 28(21), 1992.10.08, pp.2011-2013

Further, the invention relating to Claim 1 has no inventive step over the document 2 which is cited in the International Search Report. The document 2 discloses that a current is applied through divided electrodes to a tapered waveguide region provided on an emission facet side of a semiconductor laser so as to further increase the electrode density, thereby to increase the light output power, and a non-reflection coating is applied to the emission end facet. In the invention disclosed in the document 2, since non-reflection coating is not applied to a facet that is opposite to the emission end facet, it is apparent that the reflectivity at the opposite facet is different (higher than) the reflectivity at the emission end facet. As for a ridge type cladding layer, those skilled in the art can easily adopt it also in the invention of the document 2.

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## VII. Certain defects in the international application

With regard to the formality or contents of the international application, following defects are found.

In a description "... is wider than the stripe width at the light emission end facet side of the electrode part 2a adjacent thereto" in paragraph [0172], the underlined code is not consistent with the description around the code and the description for figure 6(a). It is regarded as a clerical error for "electrode part 2b".

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## Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of V-2 Part 1

Document 3: US 2002/0154393 A1 (HAMAMOTO) 2002.10.24, [0038]-[0047], FIG.1-4  
& JP 2002-319741 A

The invention relating to Claim 1 has no inventive step over the documents 2-3 which are cited in the International Search Report. The document 3 discloses that a waveguide of a semiconductor laser is constituted by a fundamental mode waveguide region, a first multi-mode waveguide region, and a second multi-mode waveguide region to improve a saturation output level that is needed for high power output, and a high-reflection coating is applied to a facet on the fundamental mode waveguide region side while a non-reflection coating is applied to a facet on the multi-mode waveguide side (refer to [0038]~[0047] and FIG.1 etc.). Since the inventions disclosed in the documents 2 and 3 have a common object to increase the output power of the semiconductor laser, those skilled in the art can easily conceive that, in the invention disclosed in the document 3, the electrode is divided and a current is applied to the emission facet side to increase the electrode density as described in the invention of the document 2. Further, as for a ridge type cladding layer, those skilled in the art can easily adopt it also in the invention disclosed in the document 3.

The invention relating to Claim 2 has no inventive step of the documents 1-3 which are cited in the International Search Report. It is easily conceived by those skilled in the art to change the transverse mode spectrum of the laser into multi-mode, in the inventions disclosed in any of the documents 1-3.

Document 4: US 5347526 A (SUZUKI et al.) 1994.09.13, Column 13, Lines 9-15 & JP 05-283818 A & DE 4310578 A

The invention relating to Claim 3 has no inventive step over the documents 1-4 which are cited in the International Search Report. It is a well-known technique to provide a semiconductor laser with a window structure. For example, in the document 4, a semiconductor laser having plural electrodes is provided with a window structure. Therefore, it is recognized that those skilled in the art can easily adopt the well-known window structure in the invention disclosed in any of the documents 1-3.

Document 5: US 5781222 A (YAMAWAKI et al) 1998.06.14, ABSTRACT & JP 08-007316 A & EP 689201 A1

The inventions relating to Claims 4-6 have no inventive step over the documents 1-3, and 5 which are cited in the International Search Report. It is a well-known technique to apply a high-frequency voltage to electrode parts to reduce return light noises in a semiconductor laser as described in the document 5, and it is recognized that those skilled in the art can easily adopt the well-known technique in the invention disclosed in any of the documents 1-3. Further, which electrode among plural electrodes should be supplied with the voltage is a term of design that can be arbitrarily selected by those skilled in the art.

The invention relating to Claim 7 has no inventive step over the documents 1-3 which are cited in the International Search Report. It is obvious for those skilled in the art to apply a modulated current to an electrode of a semiconductor laser.

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## Continuation of V-2 Part 2

The invention relating to Claim 8 has no inventive step over the document 2 which is cited in the International Search Report. The document 2 discloses a tapered waveguide structure.

The inventions relating to Claims 9-10 have novelty and inventive step over the documents cited in the International Search Report. It is not described in any of the documents cited in the International Search Report to form the stripe width of the tapered stripe structure so as to satisfy the relationship described in Claim 9 or 10, and therefore, this structure is not obvious from these documents.

Document 6: US 2002/0141467 A1 (IWAI et al) 2002.10.03, Fig.9-12 & JP 2002-299759 A & CA 2355429 A

The inventions relating to Claims 11-12 have no inventive step over the documents 2 and 6 which are cited in the International Search Report. It is described in the document 6 that, when a waveguide of a semiconductor laser is tapered, the shape of an electrode is also tapered according to the shape of the waveguide, and therefore, those skilled in the art can easily adopt this structure also in the invention disclosed in the document 2.

The invention relating to Claim 13 have novelty and inventive step over the documents cited in the International Search Report. It is not described in any of the documents cited in the International Search Report to form each of plural electrode parts into a tapered shape, and therefore, this structure is not obvious from these documents.

The invention relating to Claim 14 have novelty and inventive step of the documents cited in the International Search Report. It is not described in any of the documents cited in the International Search Report to provide, above a stripe structure (waveguide structure), a resistance layer a resistance value of which varies from a front facet of a laser resonator to a rear facet thereof, and therefore, this structure is not obvious from these documents.

Document 7: US 5561682 A (AOKI et al) 1996.10.01, Fig.2 & JP 07-226563 A & US 5784183 A1

Document 8: JP 2000-049417 A (Hitachi Ltd.) 2000.02.18, Abstract (no family)

The inventions relating to Claims 15-18 have no inventive step over the documents 1-3 and 7-8 which are cited in the International Search Report. Since a laser array in which plural laser elements that are electrically separated and have different stripe widths are integrated is a well-known technique as described in the documents 7 and 8, and therefore, those skilled in the art can easily conceive to apply the well-known technique to the invention disclosed in any of the documents 1-3.

The invention relating to Claim 19 has no inventive step over the documents 1-3 which are cited in the International Search Report. It is not recognized that it is difficult for those skilled in the art to find an idea of simply applying the invention disclosed in any of the documents 1-3 to a shorter wavelength laser of 430~455nm.

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Continuation of V-2 Part 3

The inventions relating to Claims 20-21 have no inventive step over the documents 1-3 and 5 which are cited in the International Search Report. It is recognized that those skilled in the art can adopt, for example, the technique of the document 5 to realize a vertical mode multi-spectrum in the invention disclosed in any of the documents 1-3. Further, the vertical mode spectrum interval is merely a term that can arbitrarily be set by those skilled in the art.

Document 9: US 6175440 B1 (CONEMAC) 2001.01.16, Abstract & JP 2003-510624 A & JP 07-501420 A & JP 003437182 B & US 6008925 A & US 5646766 A & US 5166944 A & US 6621609 B1 & US 5166944 A & EP 1119793 A & EP 593538 A & WO 00/020912 A1 & WO 92/022109 A1 & DE 69228244 C & AU 6295199 A & NO 20011741 A & BR 9914388 A & CN 1322307 T & TW 442667 B & PL 347162 A & CA 2346531 A & HU 103978 A & IL 142016 D & ID 29356 A & AU 773752 B & AU 655658 B & ES 2131071 T & GR 3030001 T & AT 176097 T & AU 2190492 A & CA 2110816 A & DK 593538 T

The invention relating to Claim 22 has no inventive step over the documents 2-3 and 9 which are cited in the International Search Report. It is recognized that those skilled in the art can easily conceive application of the technique described in the documents 2-3 to, for example, the semiconductor laser included in the laser projector described in the document 9 which needs high power output.